



STATE OF MICHIGAN  
DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY  
LANSING



LIESL EICHLER CLARK  
DIRECTOR

February 20, 2020

VIA E-MAIL and U.S. MAIL

Mr. James Saric  
Remedial Project Manager  
United States Environmental Protection Agency Region 5  
77 West Jackson Boulevard (SR-6J) Chicago, Illinois 60604-3511

Dear Mr. Saric:

SUBJECT: Michigan Department of Environment, Great Lakes, and Energy (EGLE) Comments for Operational Unit 5 (OU5) Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site, Area 3 Draft Feasibility Study, Revision 2 (FS), dated January 10, 2020 Prepared by Amec Foster Wheeler Environment and Infrastructure, Inc.

The coordinated effort by United States Environmental Protection Agency (USEPA) Removal Branch, Respondents to the Unilateral Administrative Order (Georgia-Pacific, Weyerhaeuser, and International Paper) Natural Resource Trustees, Great Lakes National Program Office and State of Michigan to remove the Otsego Township dam, excavate contaminated sediments and bank soils, and restore the former impounded area while enhancing recreational opportunities and wildlife habitat is a significant milestone for Area 3, OU5 and the Site as-a-whole. The contaminated sediments that were previously impounded behind the former Otsego Township dam that was ultimately owned by the State of Michigan were an impediment to the State's vision and management strategy for the State-owned bottomlands in Area 3 for the last 40 years. Under USEPA oversight and authority, removal actions have been completed throughout various portions of OU5, including in the former Plainwell dam impoundment, near former Plainwell dam No. 2, Portage Creek, and Otsego Township. The State appreciates and recognizes the significant effort and investment of time the USEPA Region 5 Removal Branch has put into planning and completing these removal actions over the last decade and commends their efforts. But, a large portion of Area 3 (i.e. floodplain, Pine Creek, banks and sediments above M-89) and the vast majority of OU5 is still contaminated with paper waste containing PCBs and other constituents of concern (COC), which continue to present an unacceptable risk to human health, injure wildlife, and degrade valuable habitat. Significant work for this Area and the remainder of OU5 is still needed to protect public health and the environment, and to begin to restore the resources that have been and continue to be injured by PCBs. It is up to the USEPA, State of Michigan and Potentially Responsible Parties to cooperatively develop sensible and sound technical approaches, oversee and implement remedial actions that will be protective in the short- and long-term, and ensure risks are adequately addressed and managed.

The detailed comments and summary provided below is the result of reviewing the

subject FS and two previous draft versions of the FS, the Alternatives Array Panel held by USEPA to discuss the Area 3 remedy, documentation and reports associated with the Time Critical Removal Action (TCRA), discussions between USEPA and EGLE legal counsel, and technical Work Group meetings, teleconferences and presentations between the USEPA, Georgia-Pacific (GP) and EGLE (formerly MDEQ) in 2017, 2018 and 2019.

- In addition to polychlorinated biphenyl (PCBs), dioxins and furans (D/F) have been identified as a constituent of concern (COC) in Area 3 and other Areas of OU5. Therefore, when defining Site COC, it is more accurate to state: COCs are PCBs and D/F and dioxin-like congener (DLC) measured as toxic equivalency (TEQ). The FS suggests that TEQ and other non-PCB constituents are co-located with PCBs based on results and conclusions from the non-PCB assessment and co-location mapping exercise and therefore a preliminary remedial goal for TEQ is unnecessary. Risk management decisions for ecological and human receptors should not be based on over-arching assumptions of co-location, which itself is based on a limited number of sample locations and data. Rather, representative data for all constituents of concern should be collected to evaluate potential exposure so that risks are adequately addressed.

Co-located Aroclor and TEQ congener data recently collected by GP in Area 1 (shown below) suggests PCBs and TEQ contaminants may not be co-located such that PCBs drive risk management in all scenarios. For instance, sample A1-TL5-5L-IM-6-12-0618 had a total PCB concentration of 2.3 milligrams-per-kilogram (mg/kg), which is below the site-specific total PCB PRG of 2.5 mg/kg, and a TEQ concentration of 197 nanograms-per-kilogram (ng/kg) which is 3 times greater than the USEPA screening level for TEQ and 2 times greater than the State of Michigan residential criteria. This is the only recently collected sample location where co-located Aroclor and congener data is available since congener analysis is not used at the site. Further analysis of these data also indicates the 'conversion factor' (CF) used at the Site to convert Aroclor concentrations to a DLC concentrations in lieu of performing congener analysis to directly measure DLCs may be substantially under-estimating the concentration and risks associated with DLCs, the DLC contribution to TEQ and, consequently, TEQs are also higher than would be predicted. Following the same process GP used to develop the 'conversion factor' described in Appendix B of the Area 1 Supplemental Remedial Investigation (dividing measured TEQ concentrations by total PCB concentrations for co-located samples and taking the median value) we see the conversion factor for these data would be 74.37 or approximately 14 times higher than the value being used at the site.

Sample Loc	Measured TEQ Mammal (ppt)	Measured DLC TEQ Mammal (ppt)	Measured DF TEQ Mammal (ppt)	Measured DLC / TEQ Mammal (%)	Total PCBs as Aroclors (ppm)	Measured TEQ / Measured total PCBs as Aroclors	Aroclor to DLC CF for Mammals (Area 1 Final SRI)	Predicted DLC Concentration Based on Wood's Aroclor to DLC CF for Mammals (ppt)	RPD of Measured DLC TEQ and Calculated DLC TEQ Based on the Aroclor to DLC CF
A1-TL5-3R-ISM-0-6-0818	192.772	55.128	137.594	28.60%	3.2	60.24	5.1	16.32	108.63%
A1-TL5-3R-ISM-6-12-0818	208.207	47.96	160.247	23.03%	3	69.40	5.1	15.3	103.26%
A1-TL5-4R-ISM-0-6-0818	218.613	55.636	162.977	25.45%	3	72.87	5.1	15.3	113.73%
A1-TL5-4R-ISM-6-12-0818	235.783	56.207	179.576	23.84%	2.7	87.33	5.1	13.77	121.29%
A1-TL5-5L-ISM-0-6-0618	195.1515	52.5625	142.589	26.93%	2.9	67.29	5.1	14.79	112.16%
A1-TL5-5L-ISM-6-12-0618	197.1532	56.5632	140.59	28.69%	2.3	85.72	5.1	11.73	131.30%
A1-TL1-22L-ISM-0-6-1018	220	84.1757	135.8243	38.26%	2.9	75.86	5.1	14.79	140.22%
A1-TL1-22L-ISM-6-12-1018	353	135.207	217.793	38.30%	3	117.67	5.1	15.3	159.34%
Aroclor to DLC CF for Mammals Based on Median of Measured TEQ / Measured total PCB as Aroclors									74.37
Aroclor to DLC CF for Mammals Based on GeoMean of Measured TEQ / Measured total PCBs as Aroclors									78.00
Aroclor to DLC TEQ CF (TEQ / total PCBs as Aroclors) for Mammals GP used in SRI/FS Documents for A1, A2, A3, A4									5.1

Text in the document discussing co-location between PCBs and TEQ should be edited to state PCBs and TEQ **may** be co-located and addressing risks to total PCBs **may** address risks to TEQ (**bold** added for emphasis)

- The step-down in fish tissue concentrations in Figures 4-1a and 4-2a are based, in part, on results from the Bryan Mill Pond (BMP) TCRA. Unlike the Area 3 TCRA, the operators at the BMP TCRA excavated material based on visual indicators, that is, the paper residuals (gray clays) were completely removed and operators were given flexibility to dig shallower or deeper based on the presence of gray clays. The benefit of the Area 3 TCRA will only be fully realized and quantified through the collection of samples from a variety of media over a prolonged period and the benefit (step-down) may be greater or lesser than what is projected in the FS models due to the difference in removal strategies and objectives in the BMP and Area 3 TCRAs.
- The FS should provide uncertainty estimates for various remedial action levels (RALs). Preliminary remedial goals (PRGs) and associated RALs have been derived for portions of the Kalamazoo River Superfund Site through the use of what- if scenarios which provide forecasts of post remedial surface weighted average concentration (SWAC), which correspond to a selected RAL. These SWAC forecasts are compared with the PRGs and generally the highest RAL corresponding to a SWAC that is less than or equal to the PRG is selected. The first evaluations conducted along these lines at the Kalamazoo and other sites were based on maps of concentrations derived from sample data, but the uncertainty in those maps was not factored into the derivation of RALs. Subsequent studies of this process revealed that targeting errors in the mapping can substantively bias the calculations toward higher RALs and correspondingly smaller remedial footprints than are necessary to achieve the actual desired performance. Because of this bias, statistical methods based on geostatistics, which account for these contaminant targeting errors have been successfully applied to correct for this systematic bias in the previously proposed SWAC forecasting methodology. It is expected that uncertainty in

mapped contaminant distributions will be factored into calculations intended to derive a correspondence between SWAC and RAL, or equivalent correspondence between percent home ranges exceeding PRGs and RALS at Area 3 as well as in other Areas of OU5.

- Discussions are ongoing between the USEPA and the State of Michigan, via email and in oral conversations, regarding the identification of the below provisions as applicable or relevant and appropriate requirements (ARARs). This comment serves to identify the State's position that these provisions are ARARs and to ensure that the ARARs have been formally timely identified while conversations are ongoing.

In GP' January 10, 2020 Area 3 Feasibility Study, Revision 2, Tables 2-1, 2-2, and 2-3 identify state ARARs for the Site. The text of the FS document also discusses ARARs at pages 2-1 to 2-12. The State below identifies ARARs that should be added to the January 10, 2020 FS Rev 2 Tables to complete the state ARARs identification for Area 3 and a modification to the text that should be included to clarify ARAR identification.

- Part 201 – should be added to chemical-specific ARARs in Table 2-1

Action/Medium	Requirements	Prerequisite	Citation	Applicable to Sediment/Soil Alternatives	
				Sediment	Soil
Generic cleanup criteria	Establishes screening levels and generic criteria for sites of environmental contamination based on current and future land use.	For non-PCB constituents of concern for OU5, if Michigan's generic cleanup criteria are more stringent than federal requirements, Michigan's Part 201 generic cleanup criteria are <b>relevant and appropriate.</b>	Michigan NREPA, Environmental Remediation (Part 201)  MCL 324.20120a and 324.20120b  Mich. Admin. Code R. 299.1-299.50		X
Site-specific cleanup criteria	MCL 324.20120a and 324.20120b authorize development of site-specific cleanup criteria if such criteria, in comparison to	For non-PCB constituents of concern for OU5, if site-specific cleanup criteria are used, the	Michigan NREPA, Environmental Remediation (Part 201)  MCL 324.20120a	X	X

	generic criteria, better reflect best available information concerning the toxicity or exposure risk posed by the hazardous substance or other factors.	applicable cancer (1 in 100,000) and noncancer risk standards (HI=1) in Michigan's NREPA at MCL 324.20120a and 20120b can be more protective than EPA standards and is <b>relevant and appropriate</b> where it is more protective.	and 324.20120b		
Risk-based Sediment Criteria for PCBs	Part 201 generic sediment cleanup criteria are not available. Site specific cleanup criteria may be required to address multiple exposure scenarios. These standards may be used in determining site-specific PCB cleanup levels.	Would apply to development of site-specific cleanup criteria for PCBs in sediment; the cancer (1 in 100,000) and noncancer (HI=1) risk standards in Michigan's NREPA can be more protective than the EPA standards, and therefore would be <b>relevant and appropriate</b>	Michigan NREPA, Environmental Remediation (Part 201)  MCL 324.20120a, 324.20120b	x	
Risk-based Soil Criteria for PCBs	MCL 324.20120a and 324.20120b authorize development of site-specific cleanup criteria if such criteria, in comparison to	In developing the site-specific criteria for PCBs, the applicable cancer (1 in 100,000) and	Risk Assessment Guidance for Superfund Volume 1, Human Health Evaluation Manual (Part		X

	<p>generic criteria, better reflect best available information concerning the toxicity or exposure risk posed by the hazardous substance or other factors.</p> <p>Protocol for developing site-specific human exposure concentrations over a representative exposure area (e.g., a residential back yard) for PCBs in soil. Concentrations are back-calculated from various cancer risk thresholds and non-cancer hazard indices based on a combination of site-specific characteristics and site-specific exposure assumptions.</p> <p>Site-specific PCB risk-based thresholds in soil (CDM 2003b):  Residential:  Carcinogenic at <math>1 \times 10^{-5}</math> risk: 2.5 mg/kg  Non-carcinogenic at HI = 1: 15 mg/kg  Recreationist:  Carcinogenic at <math>1 \times 10^{-5}</math> risk: 23 mg/kg  Non-carcinogenic at HI = 1: 139 mg/kg</p>	<p>noncancer risk standards (HI=1) in Michigan's NREPA at MCL 324.20120a and 20120b was used and is <b>relevant and appropriate</b>.</p>	<p>B, Development of Risk-based Preliminary Remediation Goals) , EPA/540/R-92/003, December 1991.</p> <p>Michigan NREPA, Environmental Remediation (Part 201)</p> <p>MCL 324.20120a and 324.20120b</p>		
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- State wetlands program – should be added to location-specific ARARs, Table 2-2

Location	Requirements	Prerequisite	Citation	Applicable to Sediment/Soil Alternatives	
				Sediment	Soil

Wetlands	Prohibits the construction, operation, or maintenance of any use or development in regulated wetlands [324.30301(d)] without a permit. Prohibited activities include draining, dredging, filling, removing soils or minerals, or maintaining a use without a permit or substantive requirements document within a wetland.	Substantive requirements apply if remedial actions affect regulated wetlands – <b>applicable</b>	NREPA, Wetland Protection (Part 303)  MCL 324.30301 - 30329  Mich. Admin Code R281.921-925	X	X
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- State wetlands program – should be added to action-specific ARARs, Table 2-3

Action	Requirements	Prerequisite	Citation	Applicable to Sediment/Soil Alternatives	
				Sediment	Soil
Use of dredging or filling in wetlands to complete remedial activities	Prohibits the construction, operation, or maintenance of any use or development in regulated wetlands [324.30301(d)] without a permit. Prohibited activities include draining, dredging, filling, removing soils or minerals, or maintaining a use without a permit or substantive requirements document within a wetland.	Substantive requirements apply if remedial actions affect regulated wetlands – <b>applicable</b>	NREPA, Wetland Protection (Part 303)  MCL 324.30301 - 30329  Mich. Admin Code R281.921-925	X	X

- State air program – should be added to action-specific ARARs, Table 2-3

Human health and wildlife risk-based limits for air emissions	Establishes rules prohibiting the emission of air contaminants in quantities that cause injurious effects to human health, animal life, plant life of significant economic value, and/or property. For certain remedial alternatives, dust emissions may need to be monitored and controlled, if appropriate	Air emissions may be generated that create threats to human health as defined in MCL 324.5501 - 5542 and Mich Admin Code R. 336.1101-2823 - <b>relevant and appropriate</b>	Michigan NREPA, Air Pollution Control (Part 55)  MCL 324.5501-5542  Mich. Admin Code R 336.1101-2823	X	X
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- Under 2.3.1.1 *Soil-Specific ARARs and TBCs*, GP wrote: “EPA’s risk-based clean up numbers for the non-PCB COCs that are included in this FS as PRGs are lower than Michigan’s standards, as such Michigan generic cleanup criteria are not ARARs.”

This language should be edited to read (changes in italics): “EPA’s risk-based *residential* clean up numbers for the non-PCB COCs that are included in this FS as PRGs are lower than Michigan’s standards, as such Michigan generic cleanup criteria are not ARARs.”

The detailed comments in the associated enclosure covers the key issues identified by EGLE’s review team. If there are any questions in regard to EGLE’s comments related to the review of the document, please contact me at 517-285-3924; peabodyd@michigan.gov; or EGLE, Remediation and Redevelopment Division, P.O. Box 30426, Lansing, MI 48909-7926.

Sincerely,



Daniel Peabody

Environmental Quality Analyst  
Remediation and Redevelopment Division  
Michigan Department of Environment,  
Great Lakes, and Energy

Enclosure

cc/enc: Dr. Keegan Roberts, CDM Smith

Mr. Scott Kirchner, CDM Smith  
Mr. Brian Bennet, CDM Smith  
Dr. John Kern, Kern Statistical Services  
Mr. Jeff Keiser, Jacobs Engineering  
Mr. Mark Mills, MDNR  
Ms. Megen Miller, MDAG

**Kalamazoo River Superfund Site Area 3 Draft Feasibility Study, Revision 2  
January 10, 2020**

**GENERAL COMMENTS**

**Commenting Organization: EGLE      Commenter:**

**General Comment #1:** The Conceptual Site Model should be updated to include deposition of PCB contaminated sediments during overbank flooding since this mechanism was evaluated in Area 1 and appreciable levels of PCBs were discovered despite the long-held assumption that PCBs would not be deposited in floodplains in free-flowing river sections.

**Commenting Organization: EGLE      Commenter:**

**General Comment #2:** The FS should provide uncertainty estimates for various remedial action levels (RALs). Preliminary remedial goals (PRGs) and associated RALs have been derived for portions of the Kalamazoo River Superfund Site through the use of what-if scenarios which provide forecasts of post remedial SWAC which correspond to a selected RAL. These SWAC forecasts are compared with the PRGs and generally the highest RAL corresponding to a SWAC that is less than or equal to the PRG is selected.

The first evaluations conducted along these lines at the Kalamazoo and other sites were based on maps of concentrations derived from sample data, but the uncertainty in those maps was not factored into the derivation of RALs. Subsequent studies of this process revealed that targeting errors in the mapping can substantively bias the calculations toward higher RALs and correspondingly smaller remedial footprints than are necessary to achieve the actual desired performance. Because of this bias, statistical methods based on geostatistics which account for these contaminant targeting errors have been successfully applied to correct for this systematic bias in the previously proposed SWAC forecasting methodology.

It is expected that uncertainty in mapped contaminant distributions will be factored into calculations intended to derive a correspondence between SWAC and RAL, or equivalently correspondence between percent home ranges exceeding PRGs and RALS at Area 3 as well as in other Areas of OU5.

**Commenting Organization: EGLE      Commenter:**

**General Comment #3:** Comments on the Area 3 Applicable or Relevant and Appropriate Requirements (ARARs) presented in the FS were provided by the Department of Attorney General (DAG) to the USEPA on April 1, 2019. Discussions regarding State ARARs are ongoing between the USEPA and DAG.

**Commenting Organization: EGLE      Commenter:**

**General Comment #4:** The entirety of the Pine Creek impoundment should be included in the FS, unless it can be scientifically justified that only a portion of the site should be included.

Revise the document accordingly.

**Commenting Organization: EGLE      Commenter:**

**General Comment #5:** Alternatives 2,3 and 4 propose discontinuing the LTM program (fish, sediment, and surface water, and fish advisories) after confirming fish tissue goals are met. EGLE believes the LTM should not be discontinued until multiple, successive rounds (MDEQ recommends three) of fish tissue data indicate that fish tissue COC goals

have been met. Revise the document accordingly. EGLE notes that the fish consumption advisory is managed by the Department of Health and Human Services using data tissue samples collected by EGLE.

**Commenting Organization: EGLE      Commenter:**

**General Comment #6:** The aeriels from 1986 and 1999 also show a narrowing of the channel in the upstream subarea relative to the other historic aeriels indicating that the upstream subarea may have been influenced by historic dam operations. Revise discussions regarding long-term channel stability for the upstream subarea accordingly

**Commenting Organization: EGLE      Commenter:**

**General Comment #7:** When defining constituents of concern (COC), it is more accurate to state: COCs are PCBs and D/F and DLC measured as TEQ. Consistent with the Area 2 Record of Decision, Remedial Action Objective 5 should state: "Protect people that reside in Area 3 from exposure to COCs that exceed protective levels". Revise all sections of the document accordingly

**Commenting Organization: EGLE      Commenter:**

**General Comment #8:** Selecting MNR as the sole remedy for the Pine Creek impoundment is presumptive. At a minimum, EGLE requests that a contingency for excavation of the Pine Creek impoundment be included in the FS in the event future sampling or evaluation of indicates that active remediation of the impoundment is necessary to achieve RAOs. Very little information is available for the Pine Creek impoundment and key components of the conceptual site model (e.g. the fish community, interactions with the Kalamazoo River, etc.) are not defined. Additionally, more than one line of evidence (i.e. fish tissue concentration data) will be needed to evaluate the overall recovery of Pine Creek and efficacy of monitored natural recovery as the sole and final remedial strategy.

**Commenting Organization: EGLE      Commenter:**

**General Comment #9:** The step-down in fish tissue concentrations are based, in part, on results from the Bryan Mill Pond (BMP) TCRA. Unlike the Area 3 TCRA, the operators at the BMP TCRA excavated material based on visual indicators, that is, the paper residuals (gray clays) were completely removed and operators were given flexibility to dig shallower or deeper based on the presence of gray clays. The benefit of the Area 3 TCRA will only be fully realized and quantified through the collection of samples from a variety of media over a prolonged period. The benefit (step-down) may be greater or lesser than what is projected in the FS models due to the difference in removal strategies and objectives in the BMP and Area 3 TCRAs. These differences and uncertainties should be discussed in relevant sections of the text.

## SPECIFIC COMMENTS

**Commenting Organization:** EGLE      **Commenter:**

**Section:** 1.2.3      **Page #:** 1-5      **Lines #:**

**Specific Comment #1:** The text states that operation of the Pine Creek WCS limits the flow of contaminated sediments from the Kalamazoo River into Pine Creek, which is accurate. However, the document should clearly state that the operation of the Pine Creek WCS may result in the mobilization of contaminated sediments already present in Pine Creek to the Kalamazoo River.

**Commenting Organization:** EGLE      **Commenter:**

**Section:** 1.3.1      **Page #:** 1-10      **Lines #:**

**Specific Comment #2:** If portions of the floodplain are inundated for a significant period of time and have the potential to support aquatic life alternate clean-up criteria may be necessary to protect the aquatic pathway. Inundation modeling and direct lines of evidence should be used to evaluate and determine whether or not alternate floodplain clean-up criteria may be warranted. This may be particularly applicable to the floodplain on the right descending bank across from Pine Creek.

**Commenting Organization:** EGLE      **Commenter:**

**Section:** 1.3.3      **Page #:** 1-12      **Lines#:**

**Specific Comment #3:** Text inserted in this section discusses the analytical methods used at the site to measure PCBs (Aroclor and congener) and states, "Reported total PCB values represent the sum of either the individual Aroclor concentrations or the individual congener concentrations measured in a sample.. The two PCB methods (total Aroclor and total congener) produce results suitable for risk management decisions and comparisons to the PRGs developed for the respective media".

The text in this section is confusing. It describes how both methods measure total PCBs but insinuates the total PCBs measured by Aroclors and the total PCBs measured by congeners are sufficiently different such that comparison to the various site-specific risk-based PRGs, which are all based on total PCBs, is dependent on the analytical method being utilized. Although not mentioned in the document, to-date, Aroclor analysis has been the predominant analytical method for measuring PCBs in a variety of media, and results are summarized and reported as 'total PCBs' and compared to site-specific risk-based clean-up levels for total PCBs. Some media (i.e. floodplain soils) have been analyzed for PCBs using the Aroclor and congener methods and those data have been collectively used and compared to the applicable PRGs for floodplain soil. In the case of fish tissue carp are analyzed for total PCBs using the Aroclor method while smallmouth bass are analyzed for total PCBs by congeners. Additional scientific evidence and references supporting these statements should be provided. If supporting references and documentation cannot be provided these statements should be revised or removed since they are inconsistent with the text in the EPA-approved site-wide risk assessments, EPA guidance, and general knowledge of PCB fate and transport and analytical chemistry amongst the scientific community.

The EPA-approved Final (Revised) Baseline Ecological Risk Assessment clearly discusses how PRGs were developed at the site:

*It should be noted that from a regulatory perspective, all PCBs are regulated in Michigan as total PCBs, not as individual PCB congeners. Also, much of the toxicological literature on PCB effects is based on total PCB exposures. Total PCB concentrations, rather than*

*Aroclor- or congener-specific PCB concentrations, are therefore used in this ERA to represent exposure concentrations. Evaluations of potential risk in this ERA are based on total PCB concentrations in abiotic media (e.g., surface water, sediment, surface soil) and biological tissues.*

An excerpt (inserted below) from the 2013 USEPA Region 4 Technical Services Section Issue Memorandum ([https://www.epa.gov/sites/production/files/2015-09/documents/r4\\_issue\\_paper\\_for\\_pcbs\\_5-15-2013.pdf](https://www.epa.gov/sites/production/files/2015-09/documents/r4_issue_paper_for_pcbs_5-15-2013.pdf)) discusses the relationship between Aroclor and congener analyses, limitations and potential sources of error in the Aroclor method, and how to determine if Aroclor data is representative.

*Though Aroclor was the original product, it weathers as it moves through the soil column or as it resides in sediment or sludges. The curve matching process used for Aroclor analysis can underestimate the total PCBs, if weathering has occurred. An evaluation of the correlation between the congener and Aroclor data is necessary so that total PCBs can be extrapolated over the entire site and for various environmental media. Region 4 TSS suggests that soil samples be obtained in suspected source (highly contaminated) areas, moderately contaminated areas and suspected clean areas and analyzed for both Aroclors and congeners so that the representativeness of the Aroclor data can be adequately evaluated. A curve produced by plotting congener total PCBs versus Aroclor total PCB data, can be used to provide correlation for the soil sampling data so that site managers can determine whether or not Aroclor data alone can be trusted at other locations to represent the total PCB concentrations in soil and water. Congener analysis may be necessary for surface soil and sediment so that the information can be incorporated into the ecological risk evaluations.*

*Note that if congener or homolog concentrations are compared with the Aroclor concentrations and found not to be consistent with the Aroclor composition, Aroclor contaminant weathering has taken place and the contaminant is really not an Aroclor, simply an assemblage of PCB homologs/congeners that appeared to match the Aroclor chromatograph curve most closely. The reason this distinction is important is that the lab analysis for determining the total PCBs in soil or groundwater is more accurately determined by congener analysis because Aroclor analysis may yield false negative data.*

**Commenting Organization: EGLE      Commenter:**

**Section: 1.3.3.6                      Page #: 1-16      Lines #:**

**Specific Comment #4:** Trends analyses appear cherry picked in that they only include limited portions of the fish tissue dataset for each species. Trend analyses should be performed using the entire dataset and discussions and conclusions of a similar length regarding trend should be inserted in addition to or in replacement of text that is currently provided. Relevant figures and tables should also be provided to support the text.

**Commenting Organization: EGLE      Commenter:**

**Section: 1.3.6.1                      Page #: 1-23                      Lines #:**

**Specific Comment #5:** The discussions on human health risks should be updated to include discussions of the risks for residents and recreationalists associated with direct contact exposure (and other relevant routes of exposure) to contaminated soils. Currently, this section only includes a brief discussion on direct contact exposures on properties that are currently residential and does not discuss risk to local residents that own property within or adjacent to the site or the risk to recreationalists. The following excerpts are taken directly from the EPA-approved Final (Revised) Human Health Risk Assessment and could be used to supplement and enhance the discussion in the FS.

- In particular, residential development has occurred adjacent to exposed floodplain soil in the vicinity of the former Trowbridge, Otsego, and Plainwell dams. These areas are completely accessible to the public and, in essence, form the "backyard" for some residents. For these reasons, a residential scenario was evaluated for direct exposure in the three floodplain areas.
- Established gardens have been observed in the former impoundment area behind Otsego Dam
- Residents who live near the exposed floodplain soils were considered the most highly exposed individuals for direct contact exposure pathways.
- Some parts of the former impounded areas abut neighborhoods and residential property and are completely accessible to children and adults. Other areas are relatively less accessible to children but are accessible to adults who may engage in recreational activities such as bird watching, picnicking, and hunting. In particular, the former impoundment areas near the Trowbridge, Otsego, and Plainwell Dams are accessible for these activities and are large enough to attract frequent visitors. For these reasons, a recreational scenario was evaluated for direct exposure in the floodplain areas.
- Residential properties are found immediately adjacent to the exposed sediments behind the Trowbridge and Otsego Dams. In some areas, the gray paper residual waste can be observed in the backyards of residential homes along the river.
- Exposure routes either directly to the river and floodplain soil, or to secondary exposure media (surface water and air), include ingestion, sediment or soil, and surface water; dermal contact with sediment or soil and surface water; and inhalation of particulates and/or vapor emissions from exposed sediments.

**Commenting Organization: EGLE      Commenter:**

**Section: 1.5                      Page #: 1-25    Lines #:**

**Specific Comment #6:** Revise the statement to note that management of risks due to PCB exposure **may** also address risks posed by other constituents. (emphasis added for comment clarity).

**Commenting Organization: EGLE      Commenter:**

**Section: 2.1                      Page #: 2-1    Lines #:**

**Specific Comment #7:** The co-location mapping did not conclude that TEQ contaminants were co-located with PCBs in Area 3 such that the PCB remedial footprint for PCBs would address risks to TEQ. At the time the *Technical Memorandum - Collocation Mapping of PCB Dioxin-Like Compound TEQs, Dioxins/Furans, and Total PCBs* (Amec, 2015) was authored the remedial footprints for Area 3 had not been decided. EGLE's review of the mapping exercise provided in Appendix G revealed that the evaluation for Area 3 only included sample results from 9 locations and that data is now 20 years old.

EGLE recommends the collection of PCB and TEQ congener data in Area 3 (and other Areas of OU5) due to the age of the existing TEQ congener data in Area 3 and site-wide concerns over the representativeness of Aroclor analytical data and the assumed co-location of contaminants that was previously discussed. Data should be collected at a scale and density adequate for remedial decision making to ensure risks associated with total PCBs, DLCs and TEQ are addressed.

**Commenting Organization: EGLE      Commenter:**

**Section: 2.2                      Page #: 2-3    Lines #:**

**Specific Comment #8:** Please add the 23 parts-per-million (ppm) PRG for total PCBs to protect recreationalists to the description and RAO 5.

**Commenting Organization: EGLE      Commenter:**

**Section: 2.3.1.3                      Page #: 2-8    Lines #:**

**Specific Comment #9:** In addition to meeting the water quality standards for total PCBs and dioxins and furans, the State of Michigan will require sampling for perfluoroalkyl substances (PFAS) as part of the substantive requirements documents process. In 2018, at-risk work done by GP at their land-based Operable Units (OU2 and OU3) identified the presence of PFAS above the applicable State of Michigan water quality criteria in groundwater at the landfill and identified the landfills and the waste materials they contain as sources of PFAS. PFAS have also been identified at OU1 in soils, paper residuals, and groundwater. Therefore, the State of Michigan will require sampling for PFAS if the remedial action includes sediment and soil dewatering via a temporary waste water treatment plant and discharges its effluent to the river or a public works facility. Additional waste characterization sampling and communications with the waste haulers and landfills selected for off-site disposal to alert them of the potential presence of PFAS contaminants will also be necessary.

**Commenting Organization: EGLE      Commenter:**

**Section: 3.1.1.7                      Page #: 3-4    Lines #: 9**

**Specific Comment #10:** The text states monitored natural recovery was retained for Pine Creek because fish tissue may meet or be near the PRG. However, earlier sections in the text state that a fish consumption advisory based on total PCBs exists in Pine Creek for bluegill, sunfish and carp, suggesting PCBs in Pine Creek may be bioavailable to fish and other biota. The fish community in Pine Creek impoundment is substantially different than the fish community in the main stem of the Kalamazoo River. The nature and extent of contamination and site boundary in Pine Creek remains undefined. Pine Creek may also serve as a source of PCBs to the Kalamazoo River during operation of the water control structure (i.e. prescribed and sustained lowering), which occurs periodically per the 1977 Flowage Agreement. These facts should be clearly stated in the document. A robust evaluation of Pine Creek should be completed to evaluate these issues before selecting monitored natural recovery as the remedy for Pine Creek.